

Strait, viz, Islote de los Evanjelistas and Punta Dungeness, at the west and east ends of the strait, respectively, and the ter-daily observations of all three stations are published *in extenso*.

The Indian Meteorological Department has prepared a series of pilot charts of the Indian Ocean, in the form of an atlas, showing the normal monthly conditions as regards pressure, winds, and currents for the region north of latitude 12° south. This work is to be published shortly.

The Indian Meteorological Department has been experimenting with a special form of recording barometer to register without attention four months at a time. If the apparatus proves successful it is intended to install it on the summit of Chur Peak, which is inaccessible during the winter months, and by the help of an observer at an inhabited station lower down the mountain to secure accurate information regarding vertical pressure gradients.

Symons's Meteorological Magazine for June, 1907, contains some particulars regarding the proposed removal of the English Meteorological Office from its present rather cramped quarters in Victoria street to a new building in South Kensington, in the vicinity of the notable group of buildings devoted to the arts and sciences which includes the Natural History Museum, the Victoria and Albert Museum, and the Imperial Institute. The Meteorological Office is to be housed under the same roof with the District Post and Telegraph Office for South Kensington. This arrangement will do away with the necessity the office is now under of maintaining private telegraph wires and a staff of telegraph clerks, as all the telegraphic work will be done by the post-office staff in an adjoining room. We do not doubt, however, that the loss of the Meteorological Office as a near neighbor will be felt by the Royal Meteorological Society, which is domiciled at 70 Victoria street; while, reciprocally, the Office will miss the close proximity of the extensive and well-administered library and archives of the Society.

At the New York meeting of the American Physical Society, March 2, 1907, a paper was read by C. C. Trowbridge entitled, "On atmospheric currents above 50 miles from the surface of the earth."<sup>2</sup> The region in question is far above the highest levels attainable by kites and balloons, and the author states that its currents can be studied only by observations of meteor trains. He has tabulated the results of 61 observations of meteor train drift; and these show that in middle latitudes the drift of the trains at great altitudes is not steadily to the eastward, as might have been supposed, but may be in any direction, tho an easterly movement predominates.

On April 14, 1907, Dr. Stefan C. Hepites, the founder and first director of the Meteorological Institute of Roumania, was relieved of the active administration of the institute, at his own request, after a service of twenty-three years, and appointed honorary director. Mr. I. St. Murat succeeds him as director. Doctor Hepites will continue to take part in the purely scientific work of the institute.

Mr. C. J. Hering, a veteran meteorological observer of Dutch Guiana, died May 30 last, at the age of 78. Mr. Hering was observer for the Smithsonian Institution as early as 1857, and afterward made observations for the United States Signal Service, the Meteorological Institute of the Netherlands, and the Bureau Central Météorologique de France.

The accompanying chart, fig. 1, shows the distribution of

the meteorological stations which the Germans have recently established in and near their colony of Kiaochau, China. At the central station, Tsingtau, observations have been made since July, 1898, and these have been published periodically in the *Annalen der Hydrographie* (Berlin); also, in part, in Heft IX of *Deutsche Überseeische Beobachtungen*, issued by the Deutsche Seewarte at Hamburg. All the Tsingtau observations are to be brought together in Heft XV of the latter publication. Heft XIV, which has just appeared, contains the complete series of observations to the end of 1904 for all the stations except Tsingtau.

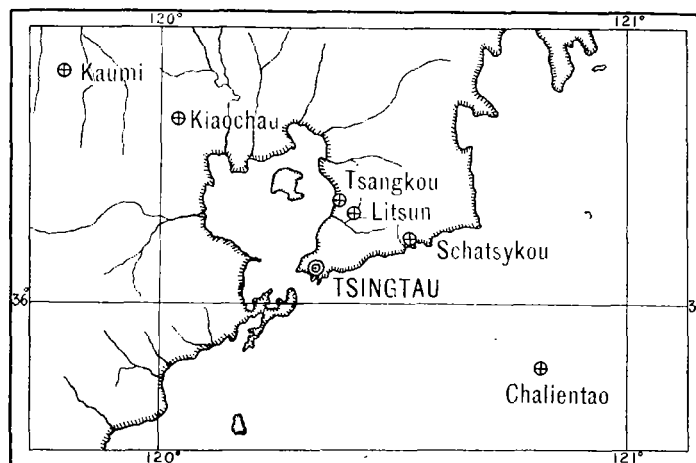


FIG. 1.—German meteorological stations in China.

Doctor Heidke, of the Deutsche Seewarte, has kindly communicated to us the location of the station Schatzykou—which is not shown on any map in the Weather Bureau Library. The rest of our chart is based upon the official *Karte von Ost-China*, issued by the Cartographic Section of the Royal Prussian Survey, 1901.

#### RELATIONS OF THE U. S. WEATHER BUREAU TO THE RAILROAD MAN.

We copy the following items from the address of Mr. H. W. Richardson, local forecaster, Duluth, Minn., before the Northern Railway Club on December 28, 1906:

During this century meteorology has made great advance and it is now accorded a place in the very front rank of the sciences. From a small beginning the Weather Bureau has grown constantly larger and more efficient. Insurance and other experts figure that it returns \$20,000,000 or more each year in property saved to the people. And this on an annual investment of about \$1,500,000 ought to be considered a fairly good proposition as regards dividends, even by railroad men, who, as most of us are led to believe, are so skilled in the art of altitudinous finance that they can even extract money or its equivalent from the commonest grade of aqua pura. And vessel experts also state that their losses are now only 25 per cent of what they would be without the storm warnings.

In railroad construction some of the important considerations are the facts regarding temperature and precipitation averages and extremes. Culverts must be made which will suffice to carry off flood water due to heavy snow or rain, and bridge construction must be such as will withstand the effects of flood and ice. Consideration must also be given the possibility of landslides due to torrential rains. The matter of temperature extremes constitutes a very important item, as iron and steel are very often greatly affected by contraction and expansion. Besides temperature conditions also materially affect the tensile strength of metals.

In all structural metal work climatic data play an important part, and due allowance must always be made for the action of temperature as well as wind force. In the first Brooklyn

<sup>2</sup> Physical Review, Lancaster, Pa., June, 1907, pp. 527-529.

bridge, for example, the variation due to the effect of temperature amounts to 3 feet vertical at the center each year. The river span also rises and falls each day under diurnal variation of heat and cold. The iron work of the bridge is practically in four parts, and when they expand with the heat the parts slide one past the other and thus correct what otherwise might prove a serious fault.

Peculiar climatic conditions often promote the corrosion of metals, and this effect may be induced by moisture or atmospheric electricity, or conditions that favor *development* of electrical action in the metal parts.

The heaving effects due to frost in the ground must be allowed for in all construction work, particularly in the foundations of bridges and trestles. This is determined by the character of the ground and the severity and frequency of low temperatures and the length of the winter period.

In cases of expected heavy rain, snow, sleet, windstorms, or floods, traffic is regulated accordingly, and weak points along the line are patrolled even more rigidly than usual in order to avert possible washouts or broken rails, or give timely warning should such a calamity actually occur.

When a severe cold wave is anticipated, consignments of perishable goods may be either refused or carried at shipper's risk, or heaters are provided for the cars, or they are round-housed, or perhaps the goods may be either immediately removed from the car, or transferred to another and safer type of car. At such times the weight and length of trains must be diminished, as the steaming efficiency of an engine is less in cold than in warm weather.

For many years, during cold weather, particularly near the close of the navigation season, the shippers of iron ore in this section have experienced more or less trouble on account of frost penetrating the ore.

When freezing occurs the best known expedient at present is to thaw the ore by steam, and that is necessarily an expensive and tedious process. Besides frozen ore also means aggravating delays in the loading of vessels. The delay of a few days now and then means the loss of a trip or two and consequent financial loss to the vessel operator, while if a large number of boats miss a trip or two in a season because of such trouble the results might be far-reaching.

Some three or four years ago the writer conceived the idea that this matter was, to some extent, capable of better regulation as far as the weather was concerned, and with that end in view the subject has been very carefully studied. From a rather crude arrangement at the start the scheme has been so elaborated and expanded that at present forecasts in considerable detail as to temperatures and storm conditions are daily furnished each ore dock and each ore railroad superintendent, as well as the principal mining companies.

The aim has been to make the forecasts as reliable and as useful as our capabilities and utilities will permit, endeavoring to so gage the forecasts and their distribution as a cooperative feature that the railroads can have plenty of manageable ore at docks during a mild spell in the frost season, while during very cold and stormy weather to aid them through this information in maintaining a nice balance between the mines and docks as regards sufficient fresh and relatively warm ore at docks or en route to meet vessel tonnage, and to keep down to the very lowest minimum the necessity of steaming, by curtailing shipments to docks during unusually critical periods. Storms, you know, sometimes delay expected vessels, and that in itself sometimes results in much mischief; for if the weather is cold enough this miscarriage of schedule may result in train loads of frozen ore.

During the critical period of this last season, the ore handling problem was generally worked out very satisfactorily as regards dispatch. This, of course, is due to increased perfection in railroad organization and equipment. From my own

standpoint I think those engaged in this trade are to be congratulated on their intelligent application of the weather forecasts, for many of the situations that at times confronted them required the very highest quality of business judgment and quick action to forestall the elements.

It is not claimed that the scheme is yet perfect, nor that our forecasts are infallible, but we hope to effect improvements from time to time, and, if possible, keep pace with the wonderful development of this traffic so far as the weather is concerned. If, instead of your having to thaw 5 per cent (or whatever the average figure has been) of all the ore shipped in the frost season, we can assist you to reduce that to 2 per cent (an allowance chargeable to storm-delayed vessels, railroad schedule interruptions, or weather forecast errors), we shall surely feel justified in believing that we have rendered you a service.

An arrangement that would effect a considerable improvement locally would be the creation of what one might term a railroad-weather clearing house. That is to say, one or more railroad officials at selected points might be designated to whom we could telephone our daily forecasts and warnings, these officials or employees in turn to distribute the information to other offices. In this way a large area could be quickly and efficiently covered. Through the courtesy of Mr. McGonagle this method is already in operation in the Wolvin Building.

Both the Duluth & Iron Range and the Duluth, Missabe & Northern railroads telegraph the daily forecasts and warnings to their important stations. This feature might be adopted with advantage by all the other railroads in this section. It would more than pay for itself in connection with railroad operations and convenience to people along the line.

#### LEGAL DECISIONS AS TO CYCLONES.

We have already had occasion to publish several legal decisions bearing on the work of the Weather Bureau or the use of meteorological terms. In a recent article on insurance we especially urged that if a policy is to protect one's property from wind, lightning, waves, or other meteorological phenomena, then the fact should be explicitly stated without any reference to cyclones, tornadoes, hurricanes, thunderstorms, or any other general meteorological terms. The importance of this caution is well illustrated by the extensive and expensive suit, resulting in an appeal to the United States Circuit Court of Appeals, Eighth Circuit, for the District of Minnesota, May, 1906.

We copy the following opinion in this case, No. 2375, in full from the official records of the circuit court as delivered by Judge Philips, May, 1906.

The Maryland Casualty Company, plaintiff in error (hereinafter for convenience designated the defendant), issued its policy of insurance to the defendants in error (hereinafter for convenience designated the plaintiffs), for a term of one year beginning the 7th day of June, 1904, and ending June 7, 1905, whereby the defendant insured the plaintiffs—

“against direct loss or damage to property owned by the assured and described in the said schedule and also for loss from liability of the assured for damage to merchandise held in trust or on commission or sold but not delivered by being removed, situate on that part of the premises occupied by the assured as described in said schedule, and caused, during the term of this insurance, by the accidental discharge or leakage of water from the automatic sprinkler system now erected in or upon the building occupied wholly or partly by the assured \* \* \* ; but the total aggregate liability of this company hereunder shall in no event exceed \$25,000”.

The policy, however, was made subject to certain specified